

## CLAIMS

045 I claim:

046 1. A remote illumination signage system as been devised consisting of:  
a light source composed of one or more light bulbs;

(a) an optical hollow tapered light pipe for concentrating and transporting light flux from said light source;

(b) a light guide injector that couples the light flux from the transporting hollow light pipe to a light emitting luminaire;

(c) a lighting luminaire for delivering light from said light source to a desired region, the luminaire being optically connected to said light source.

047 2. A lighting luminaire device has been created by casting or machining at least on irregular tapered tetrahedron light guide into a flat rectangular plastic or glass panel;

(a) That the surface of the embedded light guide is abraded, etched and/or treated to affect light refraction on the bounty between the base panel material and the imbedded light guide.

(b) That the light guide has a progressively larger cross sectional area as it lays more distal to the light injection edges.

(c) That light flux is injected via an organizational light guide into at least one edge of the light panel and thus the light flux is emitted in a uniform fashion across the light panel:

(d) providing at least one elongated imbedded tapered light guide having a surface so structured with respect to the base panel thereof as to enable said light guide to transmit light along the light guide while said periphery prevents substantial emanation of light from said light guide in a direction transverse to said light guide;

(e) modifying a portion of said periphery over an extraction zone of said light guide to impart a generally irregular tapered tetrahedron shape to said zone extending continuously from a cross sectionally small end to a cross sectionally large end thereof and so that light traveling through said core in a propagation direction from said small end to said large end will emanate in an emanation direction transversely to said propagation direction, said zon narrowing in width in a spreading dir ction transversely to said propagation direction and to said emanation direction whereby an area exposed to said light emanating from said light guide is illuminated continuously along said length of said zone; and

(f) injecting light into said light guide ahead of said narrow end so that the light propagates in said propagation direction whereby said area is illuminated.

048 3. The method defined in claim 2 whereby said light guide is machined or cast into the base panel material and said light guide is generally an irregular tapered tetrahedron shape having an increased surface area as it lays distally from a light injection edge.

(a) The surface of the embedded light guide may have additional smaller surfaces with the general irregular tapered tetrahedron shape to provide more surface area of light emission.

(b) The method defined in claim 2, further comprising the step of rendering a surface of said light guide which is exposed over said zone diffusively light emissive.

(c) The method defined in claim 2 wherein said surface is rendered diffusively light emissive by abrading said surface and/or coating said surface.

(d) The method defined in claim 2 wherein said surface is rendered diffusively light emissive by chemically treating said surface.

049 4. A device that provides illumination from a remote light source via a transporting light pipe.

(a) Light flux is injected into at least one edge of the light emitting panel from the edge that is perpendicular to the small end of the embedded light guides. That the light flux is injected parallel to the light guides.

050 5. The light flux is injected via a tapered light pipe area optically attached or part of the base panel material.

(a) That this tapered light pipe is of sufficient length to preserve the light source radiant flux density over the area of the light injecting edge of the light panel.

(b) The tapered light pipe injector provides angular averaging of the input light flux and provides a method of traversing the input light flux from the transporting light pipe while maintaining the etendue from the transporting light pipe.

(c) The light pipe injector is an integral part of the light panel system as it provides a coupling area to provide a uniform light flux from a light supply pipe of one shape and size attached to a light source and the light panel of another shape and size.

The tapered light pipe injector has one end that is the shape and size of the light flux transporting light pipe and the other end that is the shape of the light emitting panel.

051 6. The tapered light pipe injector area organizes the light flux in a uniform manner across its coupling area and eliminates high light intensity areas ("hot spots") at the light

input end of the light panel.

052 7. The tapered light pipe injector may be bent over a radius of 10 times its  $\frac{1}{2}$  thickness.

053 8. The luminaire is specifically designed to provide a light emitting surface to back light an informational or decorative medium in any application that would normally use a fluorescent, filament or arc type light bulb light box without the inherent limitations of usual light sources such as space requirements or accessibility requirements for maintenance.

(a) The ambient operating moisture, chemical and/or temperatures of the luminaires are only limited by the properties of the base plastic or glass materials used.

(b) The luminaire has no replaceable parts and is ideally suited for areas that are inaccessible or where access would create a problem such as back lit billboards with permanent mediums.

(c) The light emitting surface can be manufactured in very large sections and would be ideally suited for any large exterior back lit signage to replace front lit signage and limit the light pollution.

054 9. The emitting surface could be etched, painted, silk screened or laminated with normal signage materials

055 10. The luminaire can be surface mounted or hung.

056 11. The light source is remote from the light panel emitting surface.

057 12. The face of the panel may be permanently installed and not need access for light source bulb replacement.